FIG. 1

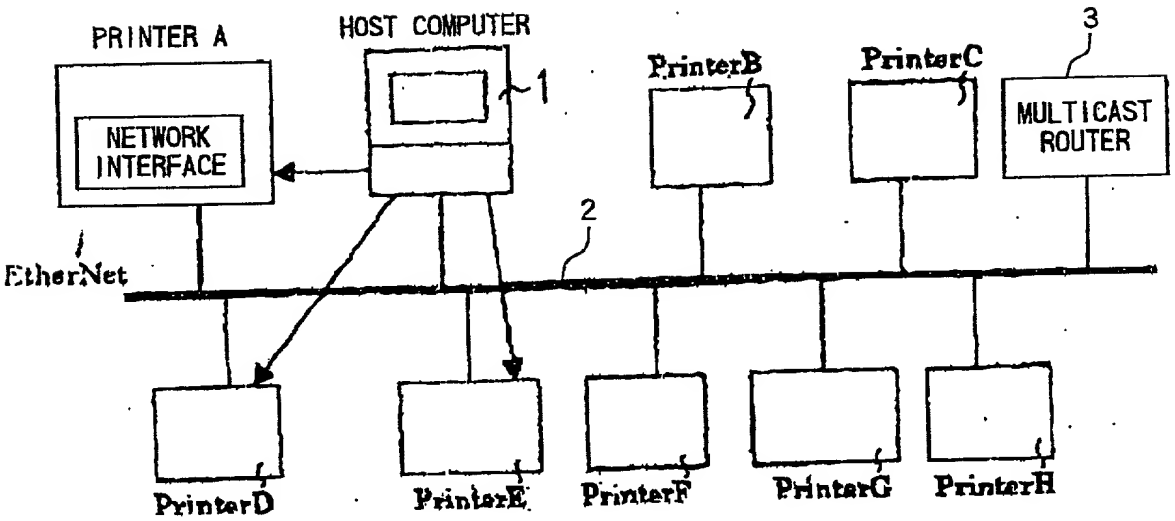
PRINTER A
HOST COMPUTER
1
NETWORK INTERFACE
PrinterB
PrinterC
3
MULTICAST ROUTER
2
EtherNet
PrinterD
PrinterE
PrinterF
PrinterG
PrinterH

FIG. 2

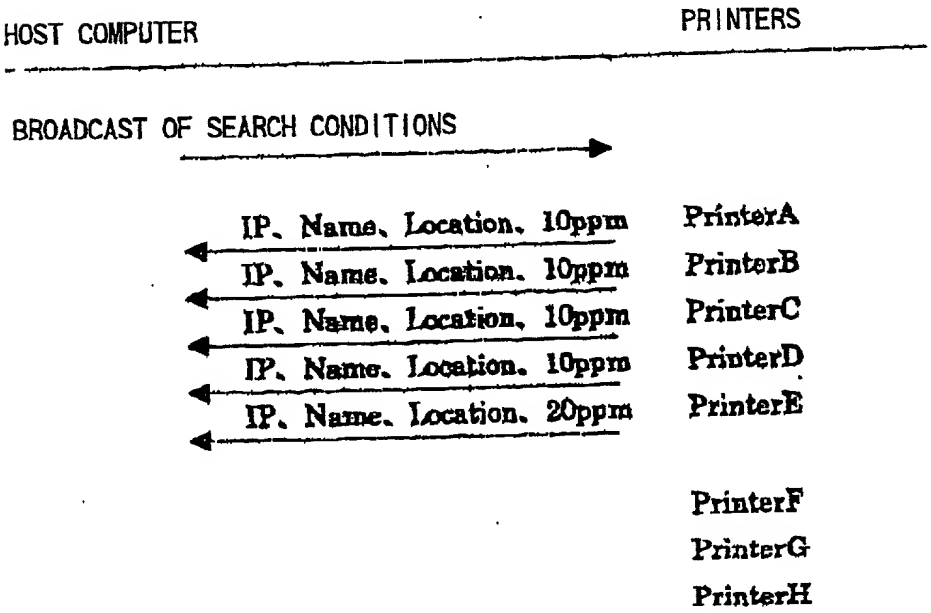
HOST COMPUTER
PRINTERS
BROADCAST OF SEARCH CONDITIONS
IP、Name、Location、10ppm
PrinterA
IP、Name、Location、10ppm
PrinterB
IP、Name、Location、10ppm
PrinterC
IP、Name、Location、10ppm
PrinterD
IP、Name、Location、20ppm
PrinterE
PrinterF
PrinterG
PrinterH

FIG. 3 (a)

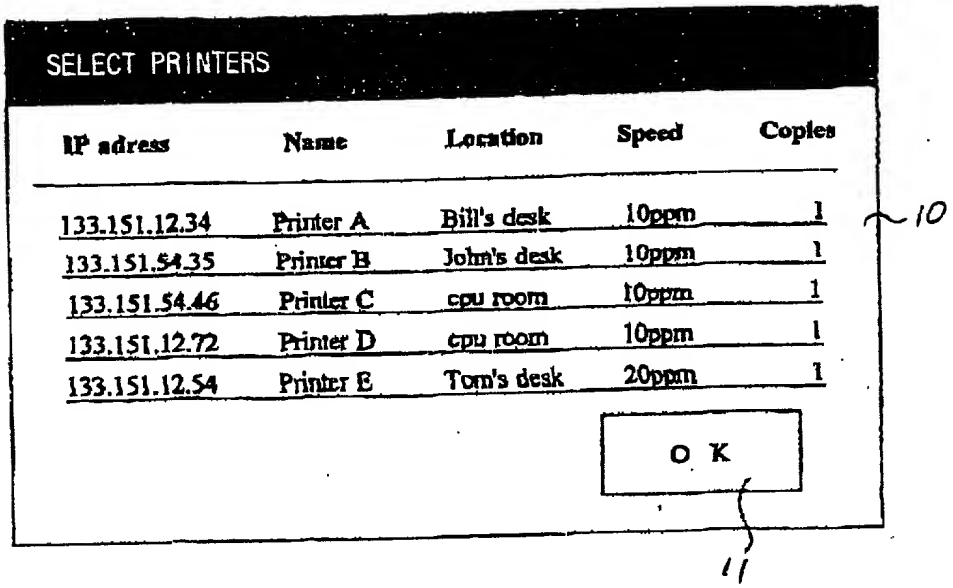
SELECT PRINTERS
IP adress
Name
Location
Speed
Copies
133.151.12.34 Printer A Bill's desk 10ppm 1
133.151.54.35 Printer B John's desk 10ppm 1
133.151.54.46 Printer C cpu room 10ppm 1
133.151.12.72 Printer D cpu room 10ppm 1
133.151.12.54 Printer E Tom's desk 20ppm 1
O K
10
11

FIG. 3 (b)

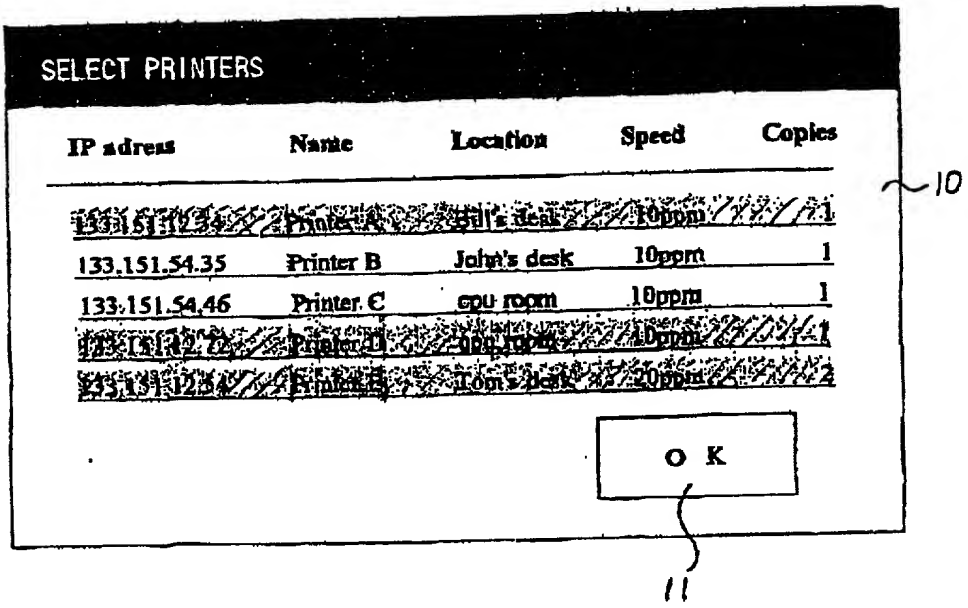
SELECT PRINTERS
IP adress
Name
Location
Speed
Copies
133.151.54.35 Printer B John's desk 10ppm 1
133.151.54.46 Printer C cpu room 10ppm 1
O K
10
11

FIG. 4

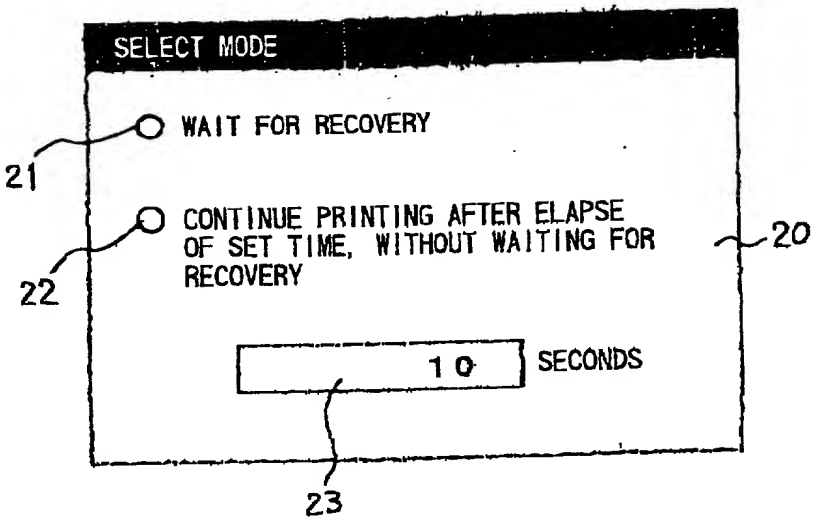
SELECT MODE
WAIT FOR RECOVERY
CONTINUE PRINTING AFTER ELAPSE OF SET TIME, WITHOUT WAITING FOR RECOVERY
10
SECONDS
21
22
20
23

FIG. 5

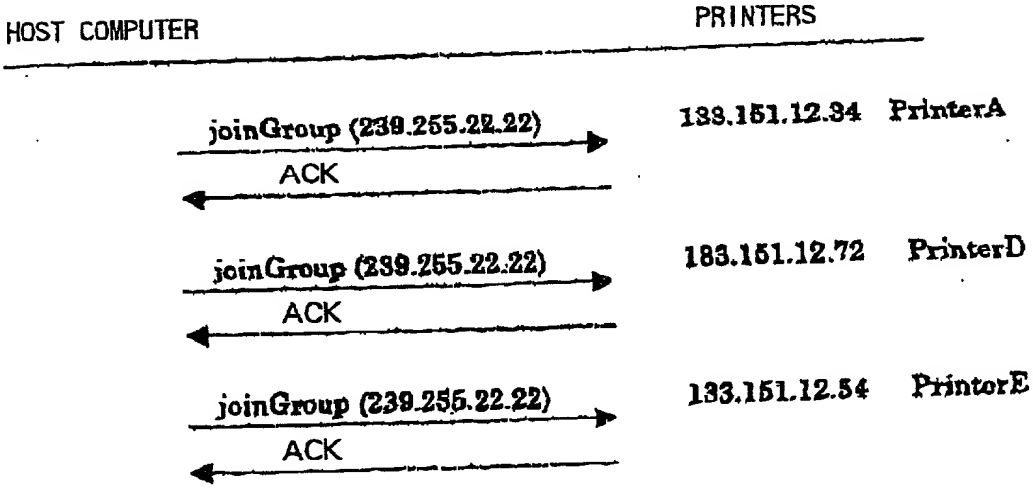
HOST COMPUTER
PRINTERS
joinGroup (239.255.22.22)
ACK
133.151.12.34 PrinterA
joinGroup (239.255.22.22)
ACK
133.151.12.72 PrinterD
joinGroup (239.255.22.22)
ACK
133.151.12.54 PrinterE

FIG. 6 (a)

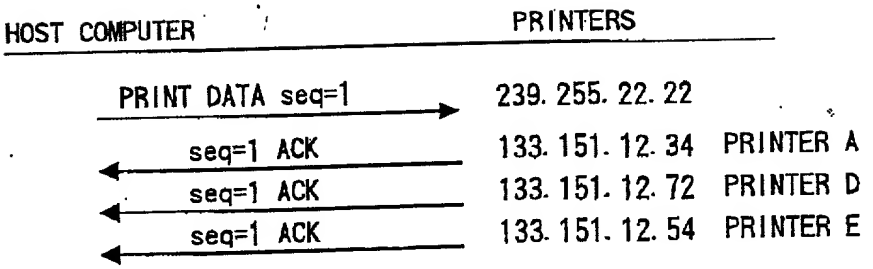

FIG. 6 (b)

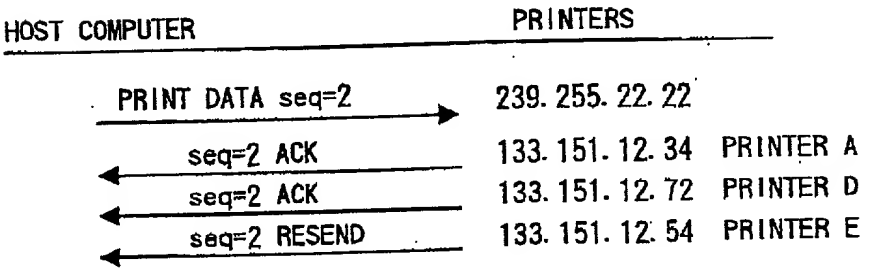

FIG. 6 (c)

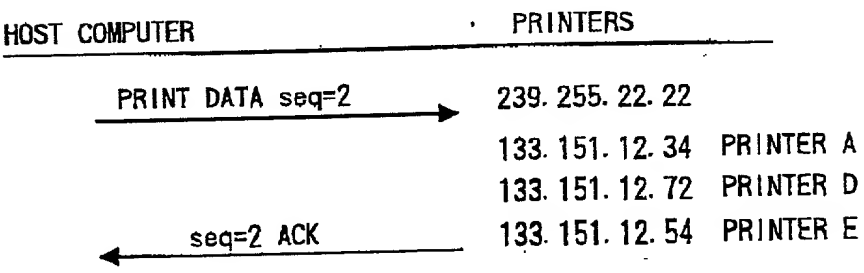

FIG. 6 (d)

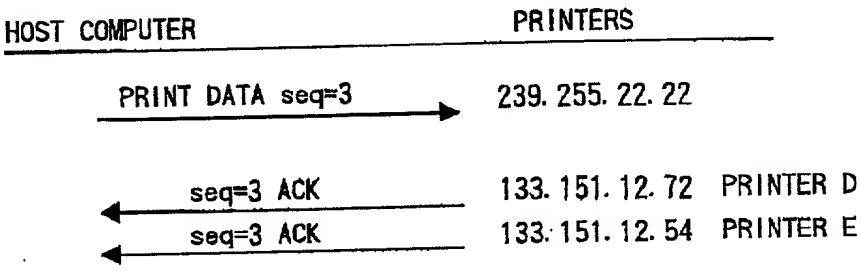

FIG. 6 (e)

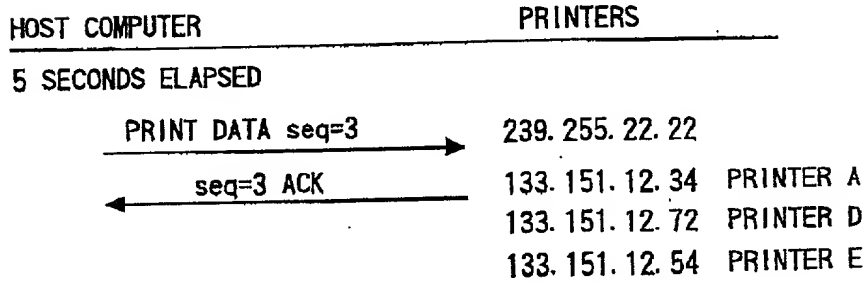

FIG. 7 (a)

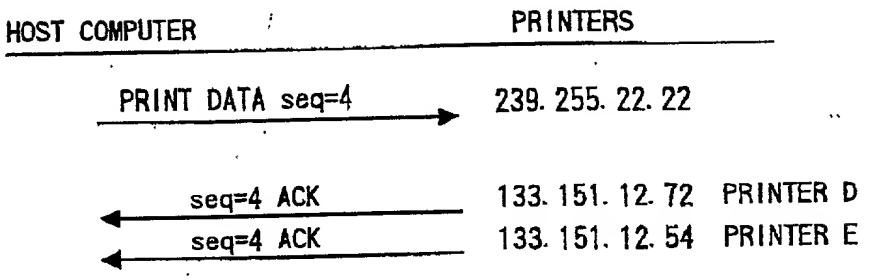

FIG. 7 (b)

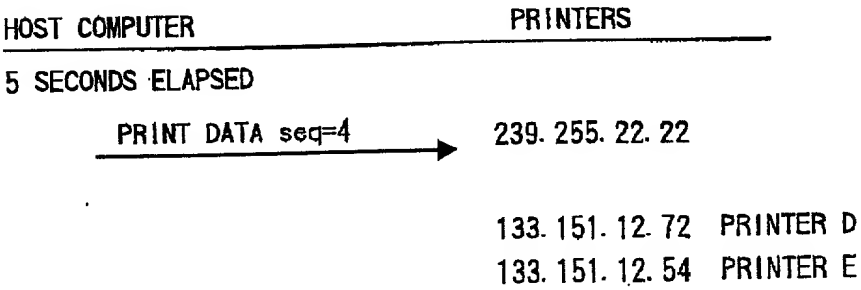

FIG. 7 (c)

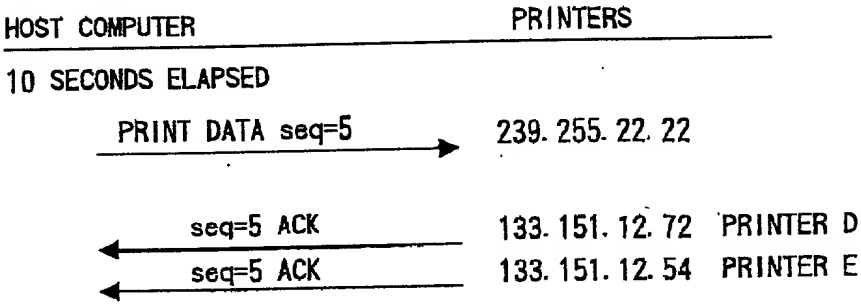

FIG. 7 (d)

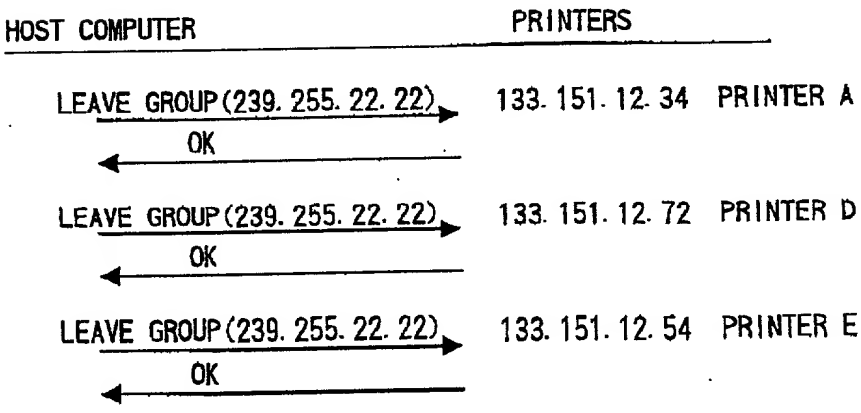

FIG. 8

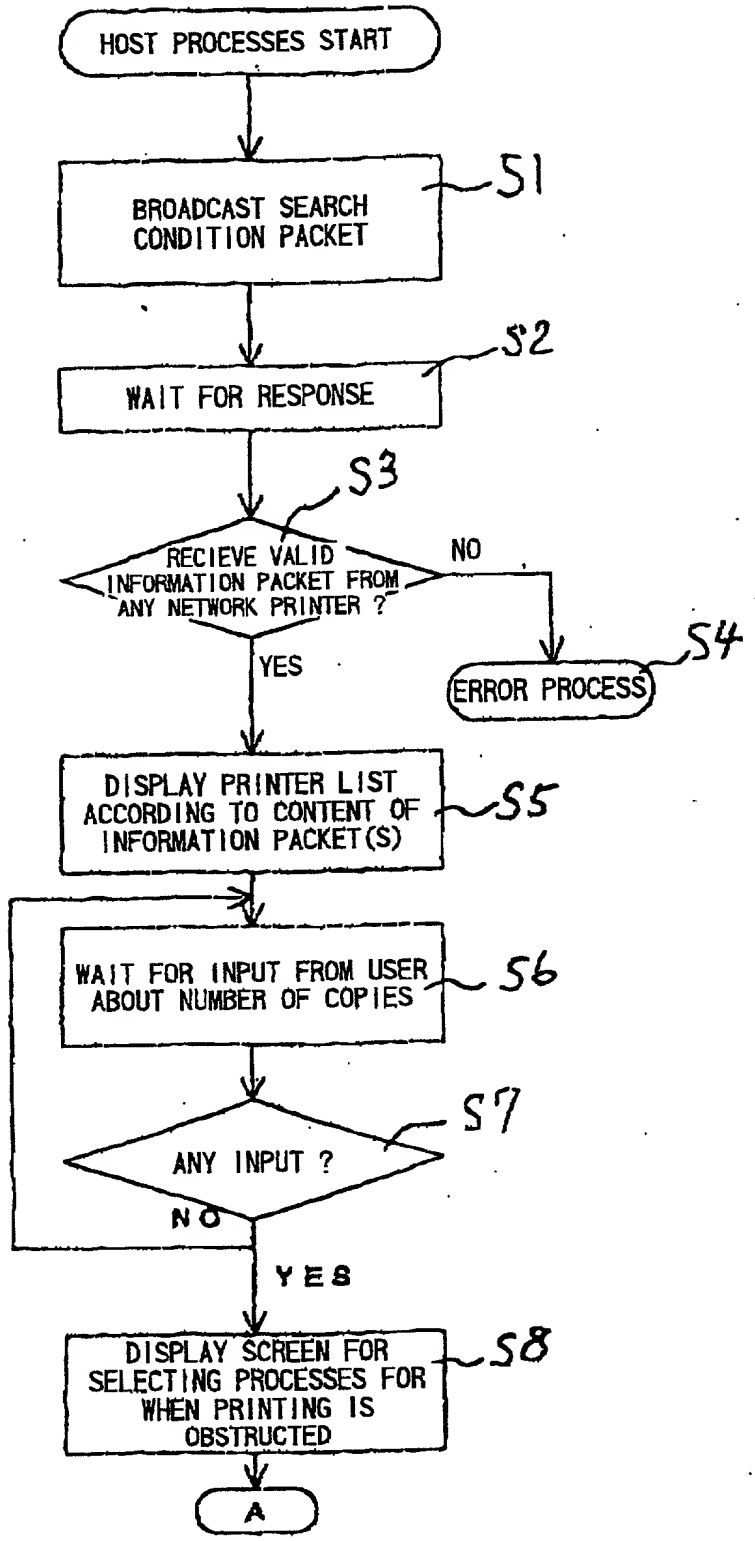
HOST PROCESSES START
BROADCAST SEARCH CONDITION PACKET
S1
WAIT FOR RESPONSE
S2
S3
RECIEVE VALID INFORMATION PACKET FROM ANY NETWORK PRINTER ?
NO
YES
ERROR PROCESS
S4
DISPLAY PRINTER LIST ACCORDING TO CONTENT OF INFORMATION PACKET(S)
S5
WAIT FOR INPUT FROM USER ABOUT NUMBER OF COPIES
S6
ANY INPUT ?
S7
NO
YES
DISPLAY SCREEN FOR SELECTING PROCESSES FOR WHEN PRINTING IS OBSTRUCTED
S8
A

FIG. 9

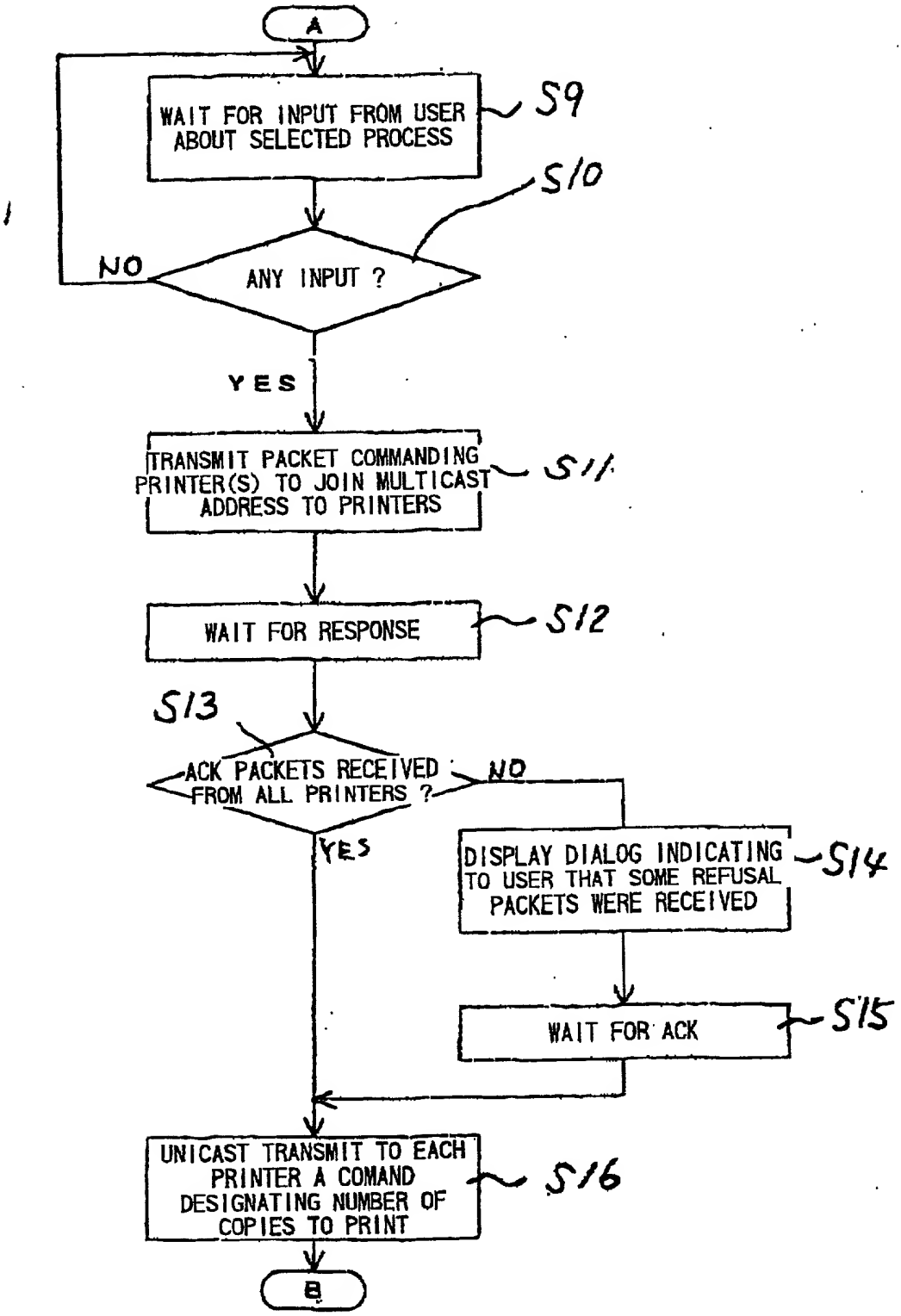
A
WAIT FOR INPUT FROM USER ABOUT SELECTED PROCESS
S9
S10
ANY INPUT ?
NO
YES
TRANSMIT PACKET COMMANDING PRINTER(S) TO JOIN MULTICAST ADDRESS TO PRINTERS
S11
WAIT FOR RESPONSE
S12
S13
ACK PACKETS RECEIVED FROM ALL PRINTERS ?
NO
YES
DISPLAY DIALOG INDICATING TO USER THAT SOME REFUSAL PACKETS WERE RECEIVED
S14
WAIT FOR ACK
S15
UNICAST TRANSMIT TO EACH PRINTER A COMAND DESIGNATING NUMBER OF COPIES TO PRINT
S16
B

FIG. 10

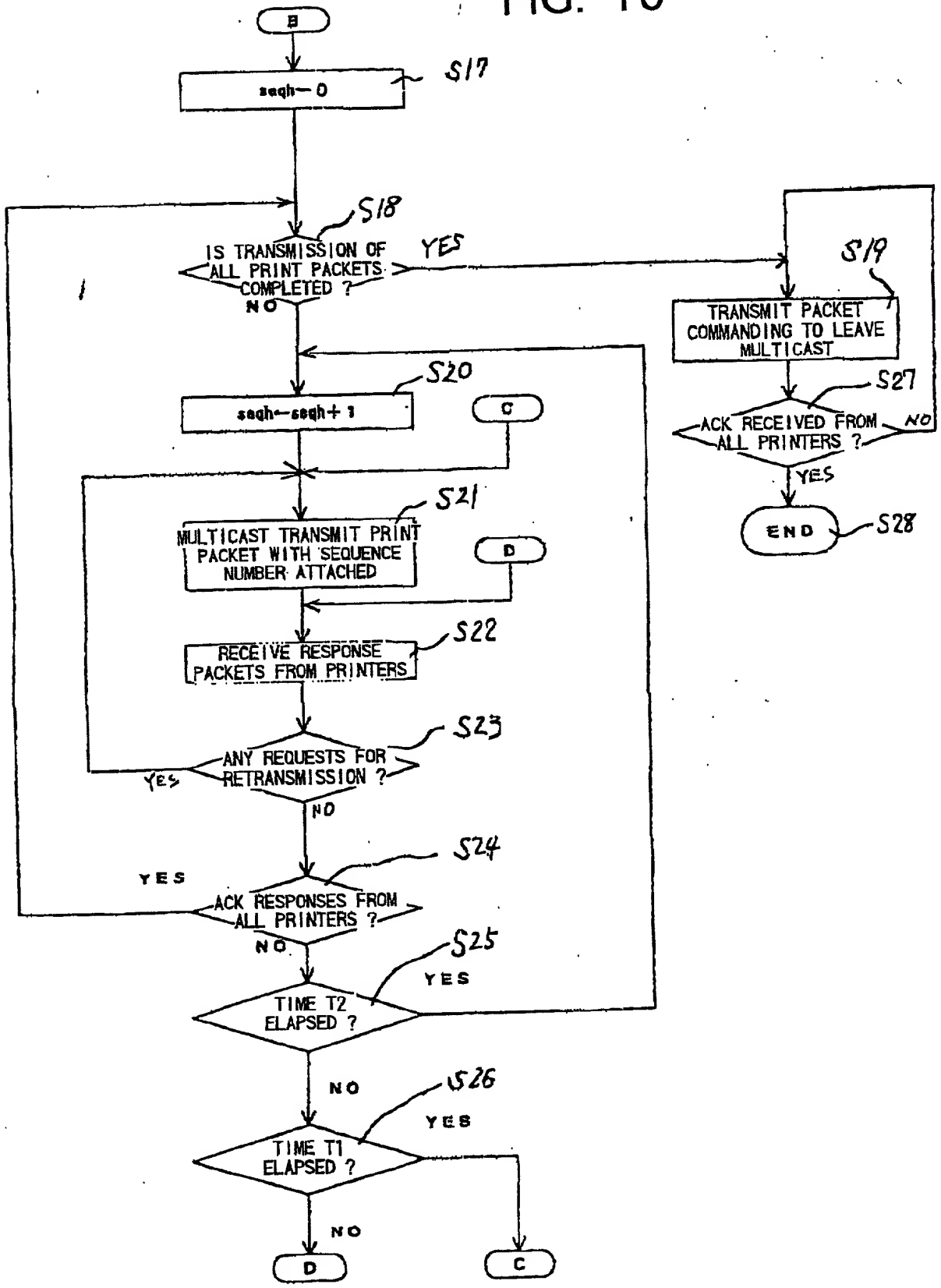
B
seqh←0
S17
S18
IS TRANSMISSION OF ALL PRINT PACKETS COMPLETED ?
YES
NO
S19
TRANSMIT PACKET COMMANDING TO LEAVE MULTICAST
S27
ACK RECEIVED FROM ALL PRINTERS ?
NO
YES
END
S28
S20
seqh←seqh+1
C
S21
MULTICAST TRANSMIT PRINT PACKET WITH SEQUENCE NUMBER ATTACHED
D
S22
RECEIVE RESPONSE PACKETS FROM PRINTERS
S23
ANY REQUESTS FOR RETRANSMISSION ?
YES
NO
S24
YES
ACK RESPONSES FROM ALL PRINTERS ?
NO
S25
YES
TIME T2 ELAPSED ?
NO
S26
YES
TIME T1 ELAPSED ?
NO
D
C

FIG. 11

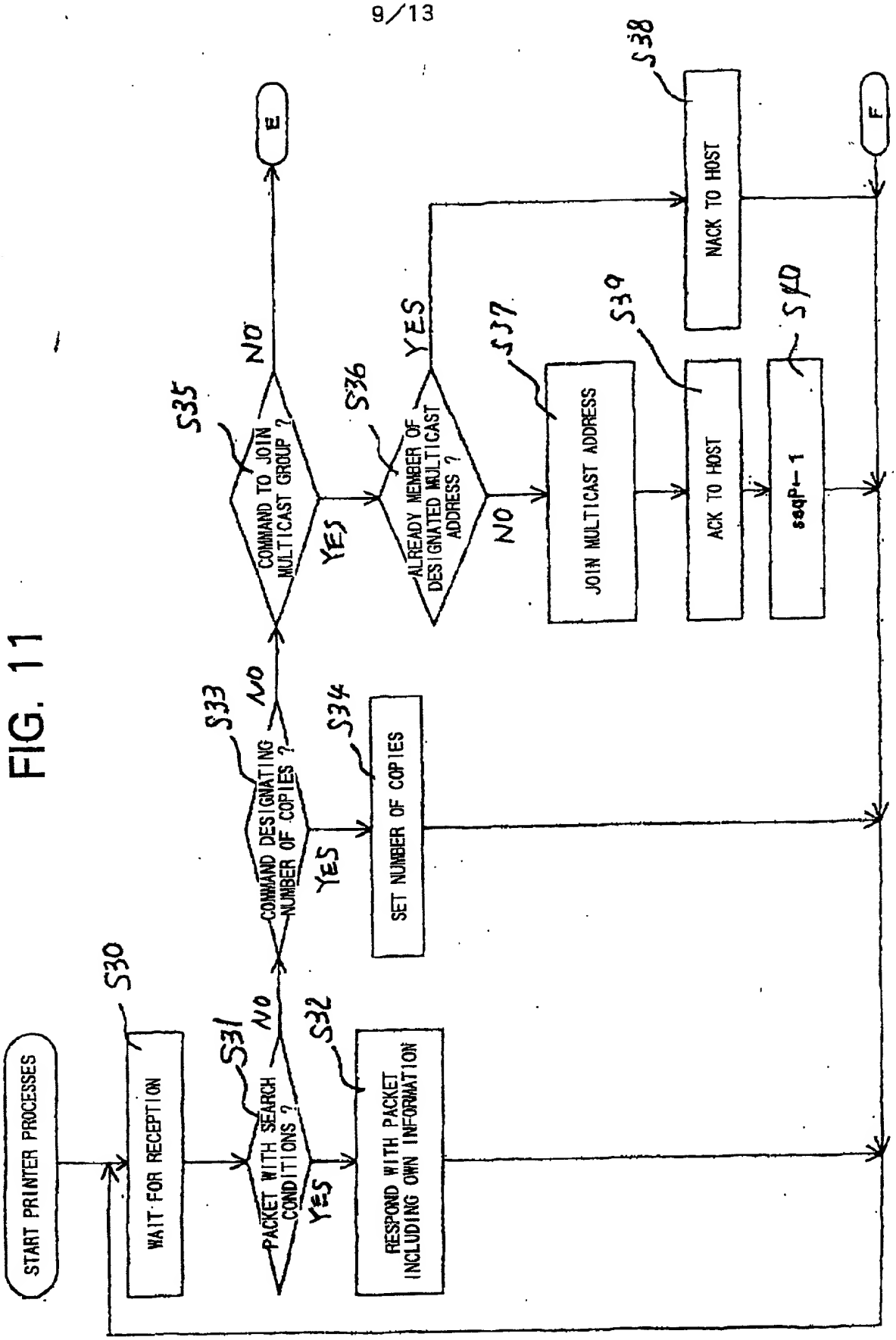
START PRINTER PROCESSES
S30
WAIT FOR RECEPTION
S31
PACKET WITH SEARCH CONDITIONS ?
NO
YES
S32
RESPOND WITH PACKET INCLUDING OWN INFORMATION
S33
COMMAND DESIGNATING NUMBER OF COPIES ?
NO
YES
S34
SET NUMBER OF COPIES
S35
COMMAND TO JOIN MULTICAST GROUP ?
NO
YES
E
S36
ALREADY MEMBER OF DESIGNATED MULTICAST ADDRESS ?
YES
NO
S37
JOIN MULTICAST ADDRESS
S38
NACK TO HOST
S39
ACK TO HOST
S40
seqP←1
F

FIG. 12

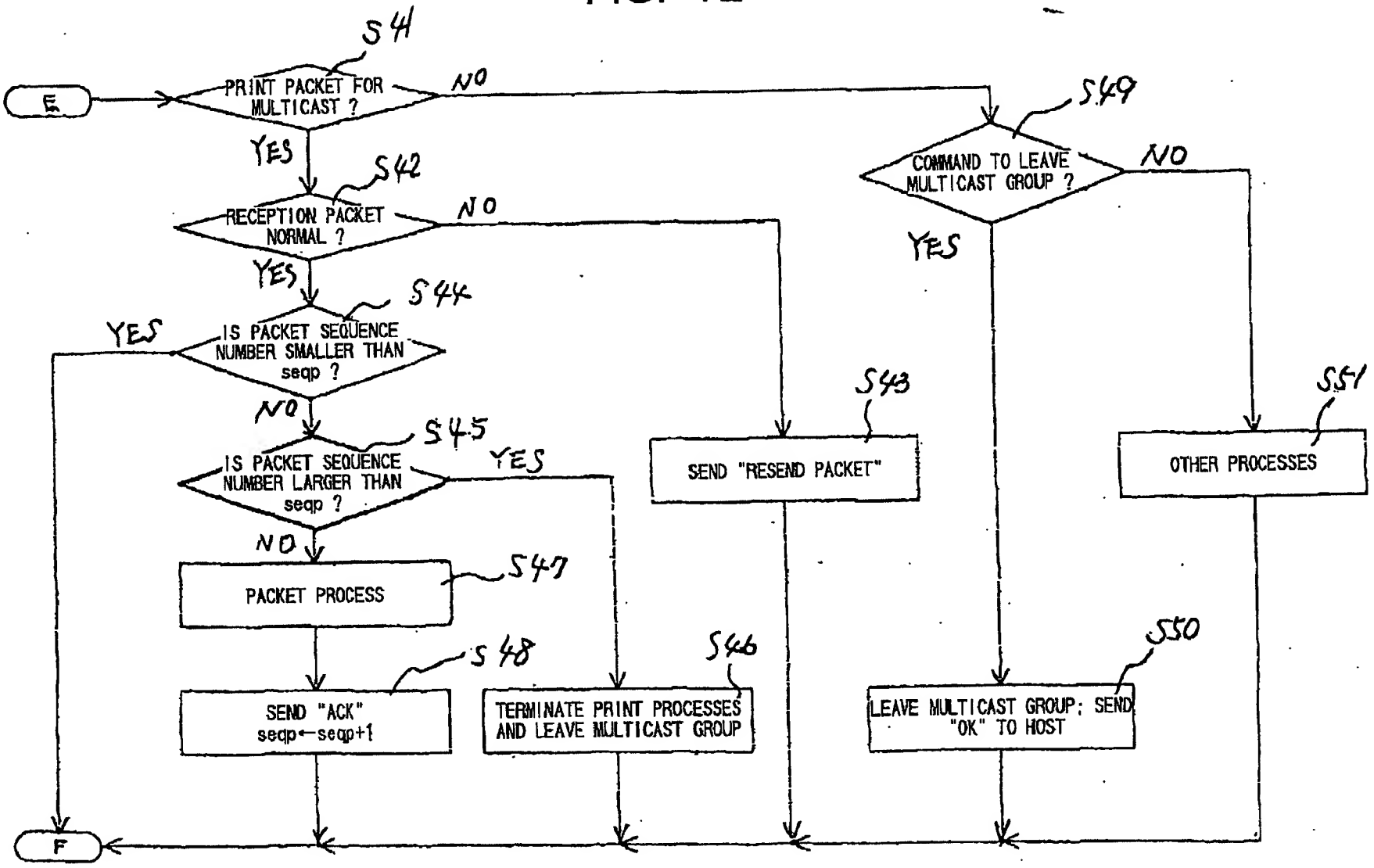
E
S41
PRINT PACKET FOR MULTICAST ?
NO
YES
S42
RECEPTION PACKET NORMAL ?
NO
YES
S44
IS PACKET SEQUENCE NUMBER SMALLER THAN seqp ?
YES
NO
S45
IS PACKET SEQUENCE NUMBER LARGER THAN seqp ?
YES
NO
PACKET PROCESS
S47
SEND "ACK" seqp←seqp+1
S48
TERMINATE PRINT PROCESSES AND LEAVE MULTICAST GROUP
S46
S49
COMMAND TO LEAVE MULTICAST GROUP ?
NO
YES
S43
SEND "RESEND PACKET"
S51
OTHER PROCESSES
LEAVE MULTICAST GROUP; SEND "OK" TO HOST
S50
F

FIG. 13

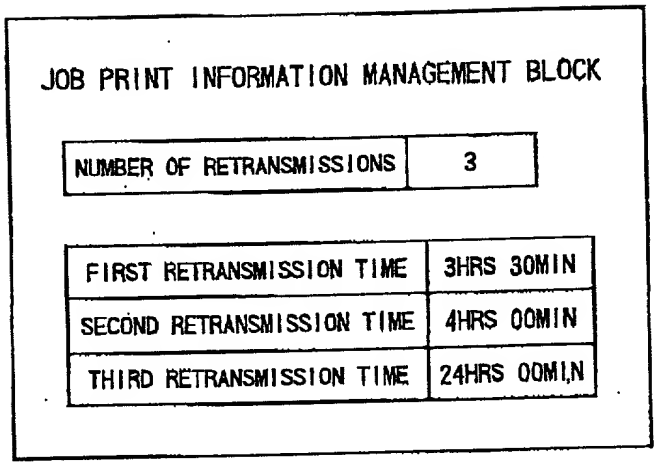
JOB PRINT INFORMATION MANAGEMENT BLOCK
NUMBER OF RETRANSMISSIONS
3
FIRST RETRANSMISSION TIME
3HRS 30MIN
SECOND RETRANSMISSION TIME
4HRS 00MIN
THIRD RETRANSMISSION TIME
24HRS 00MIN

FIG. 14 (a)

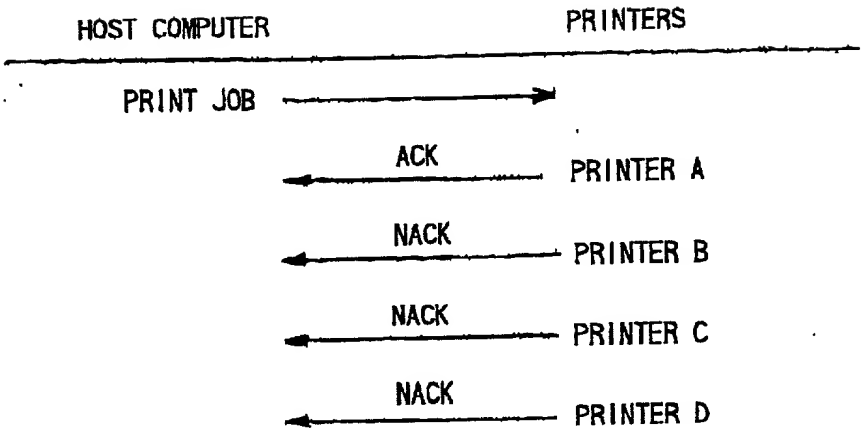

FIG. 14 (b)

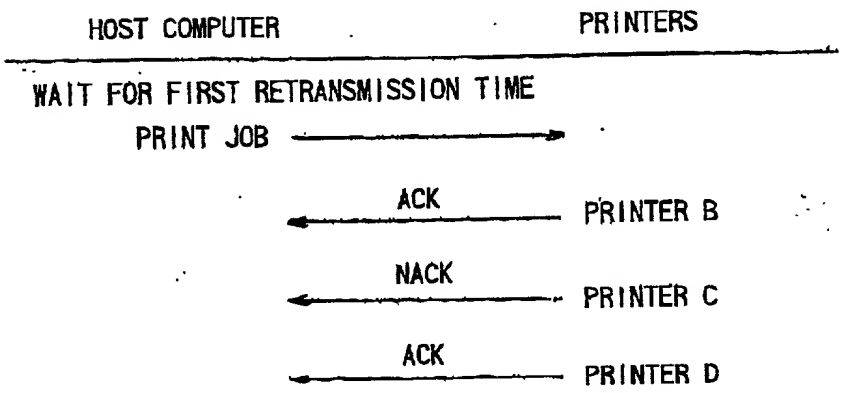

FIG. 14 (c)

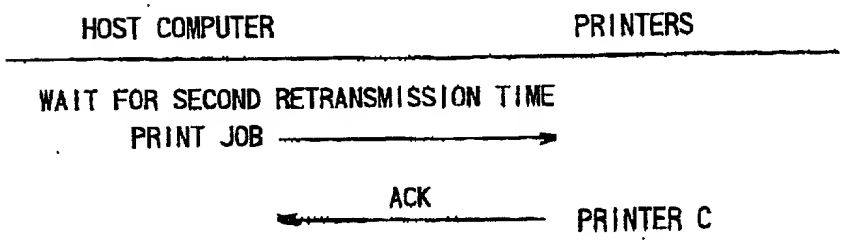

FIG. 15 (a)

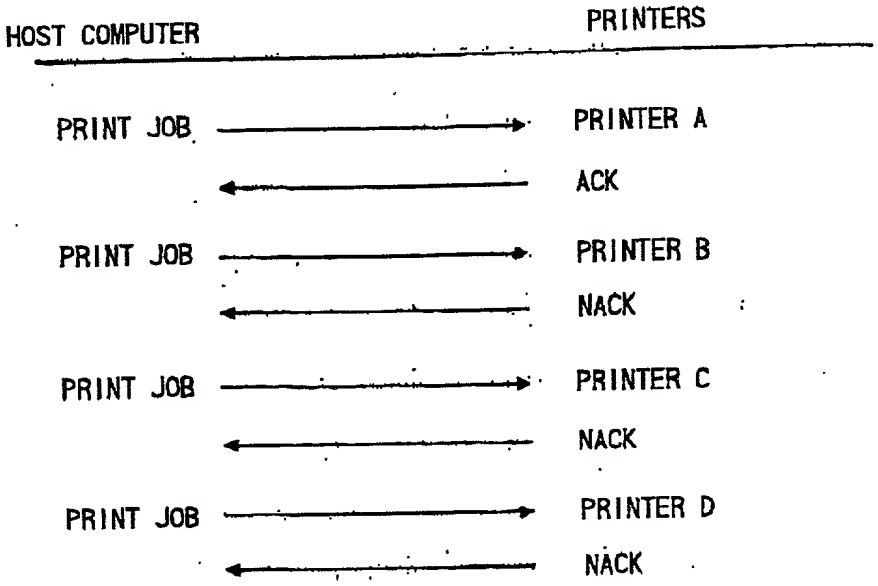

FIG. 15 (b)

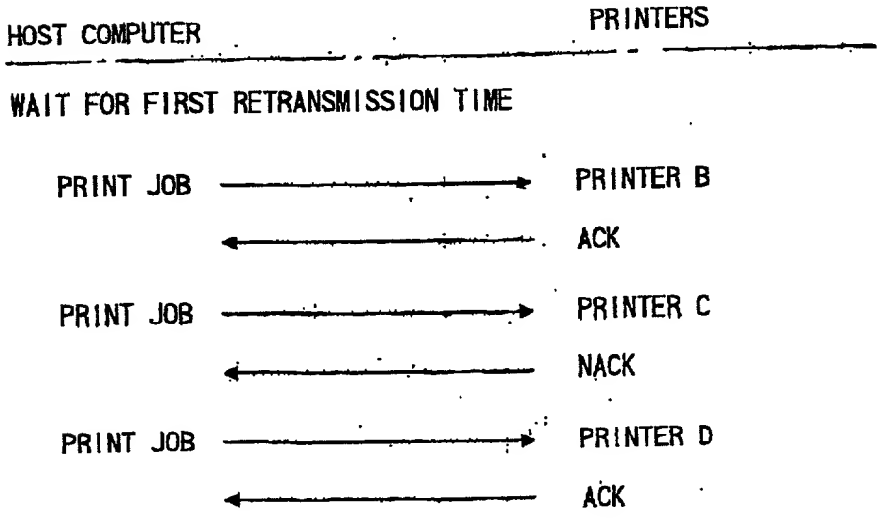
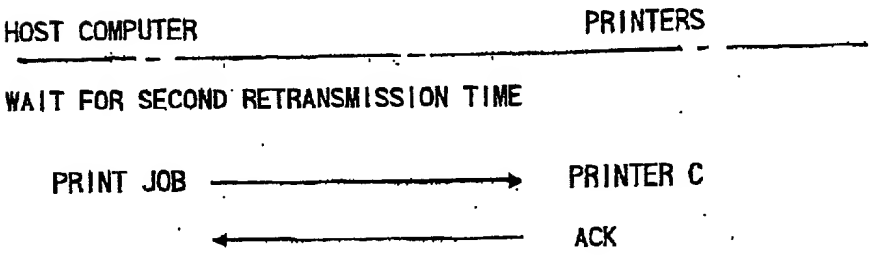
FIG. 15 (c)